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Branch Retinal Vein Occlusion after Cataract Surgery: A Case Report

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Abstract

Aim: This study aims to present a rare case of branch retinal vein occlusion (BRVO) that developed after cataract surgery and to evaluate possible preoperative and intraoperative risk factors. **Background:** Cataract surgery is one of the most frequently performed ophthalmic surgical procedures worldwide, generally associated with favorable outcomes. However, as with all surgeries, complications may occur, including rare retinal vascular occlusions such as BRVO. **Case Presentation:** A 62-year-old male with hypertension but no other systemic comorbidities underwent right-eye phacoemulsification and intraocular lens implantation for grade 4 nuclear cortical cataract. The surgery was prolonged due to poor pupillary dilation and dense lens nucleus, requiring high phacoemulsification energy and elevated intraocular pressure (IOP) settings. One week postoperatively, fundus examination revealed BRVO in the superior temporal quadrant, confirmed with fluorescein angiography (FA) and optical coherence tomography (OCT), which also demonstrated cystoid macular edema. The patient received three monthly intravitreal injections of aflibercept (2 mg/0.05 mL), resulting in complete resolution of macular edema and improvement in visual acuity from 20/200 to 20/40. **Conclusion:** Although rare, BRVO may develop after cataract surgery, particularly in patients with hypertensive retinopathy and intraoperative conditions that cause fluctuations in IOP. Awareness of these risk factors and careful perioperative management may help reduce the risk of such complications.

Keywords

Branch Retinal Vein Occlusion, Phacoemulsification, Cataract Surgery Complications

1. Introduction

Cataract surgery is the most frequently performed ophthalmic surgical procedure

worldwide, with approximately 10 million operations conducted annually [1] [2]. Although generally regarded as an effective and safe surgery, various intraoperative and postoperative complications can occur. One of the rare complications is retinal vascular occlusion, which can develop during surgery. In the literature, cases of retinal vascular occlusion following ophthalmic surgical procedures have been reported, mostly after vitreoretinal surgery, and include both branch retinal vein occlusion (BRVO) and central retinal artery occlusion (CRAO) [3].

Risk factors for BRVO include hypertension, hyperlipidemia, increased body mass index, thrombophilia, hyperviscosity, renal dysfunction, systemic drug use, and other systemic diseases [4].

BRVO most often occurs at arteriovenous crossing sites, where the artery and vein share a common adventitial sheath [5]. In most cases, the artery lies anterior to the vein at the site of occlusion, suggesting that arterial pathology may contribute to the development of venous blockage. Arterial thickening at the crossing can compress the vein, leading to hemodynamic changes, endothelial damage, and thrombus formation [5].

Cataract surgeries can be performed under topical, sub-Tenon's, peribulbar, or retrobulbar anesthesia. Cases of CRAO have been reported following retrobulbar [6], peribulbar [7], and sub-Tenon's [8] anesthesia.

In this report, we present a case of BRVO that developed after a prolonged cataract surgery in a patient with hypertensive retinopathy but no other systemic risk factors. We also discuss potential risk factors and possible mechanisms related to cataract surgeries in the development of BRVO [6]-[8].

2. Case Description

A 62-year-old male patient presented with a one-year history of decreased vision in his right eye. His medical history was notable only for systemic hypertension, for which he was on antihypertensive medication.

Ophthalmic examination revealed best-corrected visual acuity (BCVA) of 20/200 in the right eye and 20/25 in the left eye. Pupillary light reflexes were normal, and no afferent pupillary defect was detected. Intraocular pressure (IOP), measured with a non-contact tonometer, was 14 mmHg in the right eye and 15 mmHg in the left eye.

Anterior segment bio-microscopy showed a clear cornea, normal anterior chamber and iris, and a mid-dilated pupil in the right eye after 1% cyclopentolate instillation. The right lens exhibited grade 4 nuclear cortical cataract, while the left lens showed grade 1 - 2 nuclear cortical cataract.

Fundus examination of the right eye was partially limited by cataract but revealed normal optic disc and macula, with venous tortuosity and arteriovenous crossing changes consistent with stage 2 hypertensive retinopathy (HTRP). The left eye fundus was normal except for similar stage 2 HTRP findings.

Preoperatively, no clinical signs suggestive of branch retinal vein occlusion (BRVO) were noted on funduscopic examination, although visualization was par-

tially limited by the dense cataract. Due to media opacity, high-quality color fundus photographs and OCT scans of the affected eye could not be obtained. Fluorescein angiography was not performed preoperatively, as it is not part of our routine cataract surgery evaluation protocol and is considered an invasive test without clear preoperative indication.

B-scan ultrasonography of the right eye demonstrated a normal vitreous and attached retina. Following informed consent, cataract surgery was planned.

Preoperative preparation included topical instillation of 1% tropicamide, 2.5% phenylephrine, and 1% cyclopentolate every 10 minutes. Systemic blood pressure was measured at 140/80 mmHg under antihypertensive therapy.

Anesthesia was achieved via sub-Tenon's injection of 2 mL 2% lidocaine in the inferonasal quadrant [9]. No digital massage was applied, and there were no signs of proptosis or retrobulbar hemorrhage.

Surgical procedure consisted of standard phacoemulsification with foldable intraocular lens implantation in the capsular bag. Due to a mid-dilated pupil and dense cataract, surgery lasted approximately 30 minutes. High torsional phaco energy (70) and an aspiration/flow rate of 32 were used, with intraoperative IOP settings at 50 mmHg [10] [11].

On postoperative day 1, BCVA in the right eye was 20/400. The cornea was edematous; anterior chamber and iris were normal; intraocular lens was well-centered; and there was no wound leakage. Fundus view was obscured by corneal edema. B-scan ultrasonography showed an attached retina and clear vitreous. The patient was prescribed topical dexamethasone 0.1% four times daily, moxifloxacin 0.5% four times daily, dexamethasone ointment once daily, and 3% NaCl four times daily.

One week postoperatively, BCVA improved to 20/200, IOP was 15 mmHg, corneal edema was minimal, and mild anterior chamber reaction (1+ cells) was present. Fundus examination revealed normal optic disc, but in the superior temporal quadrant and upper half of the retina, venous tortuosity, arterial narrowing, preretinal hemorrhages, cotton-wool spots, and retinal pallor were noted. The left eye retained findings consistent with stage 2 HTRP (**Figure 1**).

Fluorescein angiography (FA) showed superior BRVO in the right eye with venous tortuosity, capillary bed leakage, ischemic areas, and blockage corresponding to preretinal hemorrhage. The left eye showed only mild venous tortuosity (**Figure 2**).

Optical coherence tomography (OCT) of the right macula revealed cystoid macular edema and intraretinal fluid (**Figure 3**). The left macula was normal except for posterior vitreous detachment (**Figure 4**).

A diagnosis of intraoperative branch retinal vein occlusion with secondary cystoid macular edema was made. The patient received three monthly intravitreal aflibercept injections (2 mg/0.05 mL; Eylea, Regeneron Pharmaceuticals). Internal medicine consultation excluded additional systemic causes beyond hypertension. Aflibercept was selected as the anti-VEGF agent due to its proven efficacy in

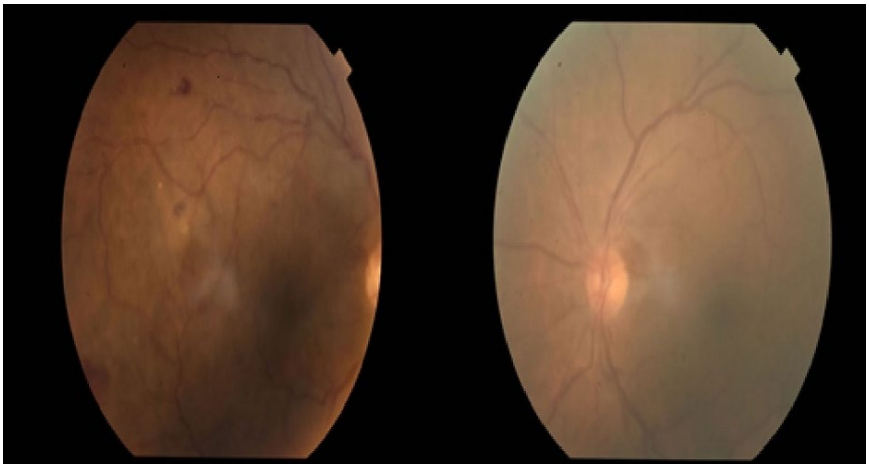

Figure 1. Color fundus photographs of both eyes. The right eye shows branch retinal vein occlusion in the superior quadrant with ischemic involvement extending to the macula.

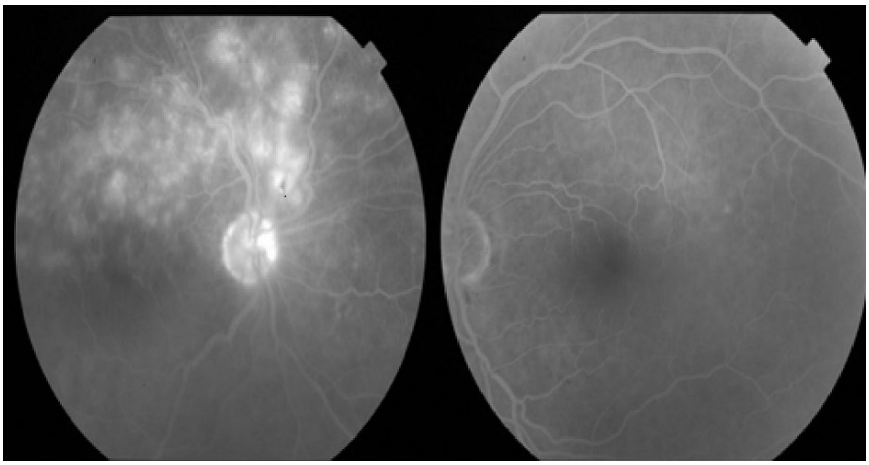

Figure 2. Fluorescein angiography of the right eye demonstrating marked tortuosity, venous leakage, and hyperfluorescence involving the macular region; left eye shows stage 2 hypertensive retinopathy changes.

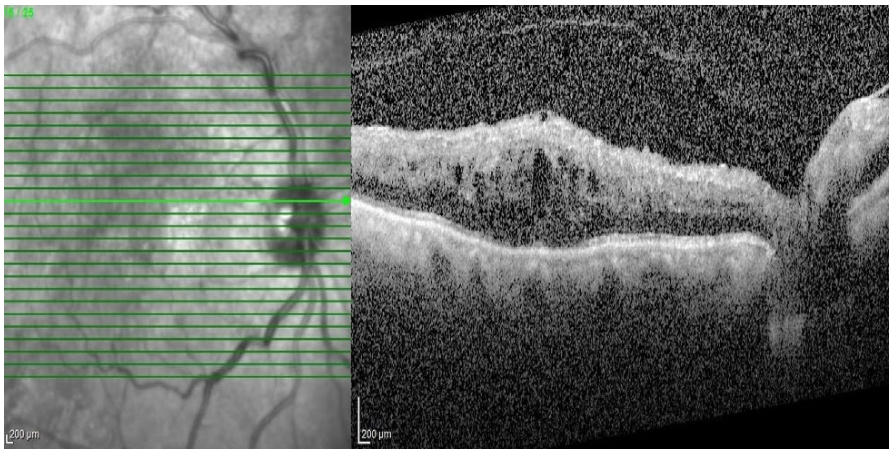

Figure 3. OCT of the right eye at week 1 showing cystoid macular edema and intraretinal fluid.

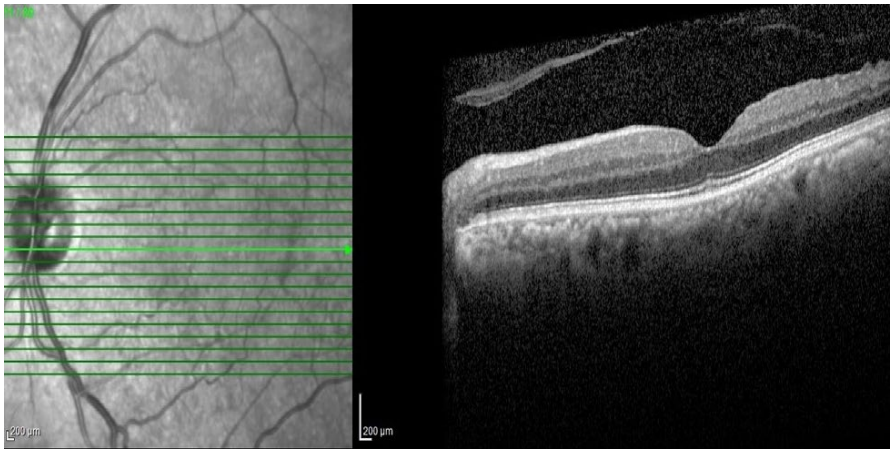

Figure 4. OCT of the left eye at 3 months showing Posterior Vitreous Detachment with intact fovea and retinal layers.

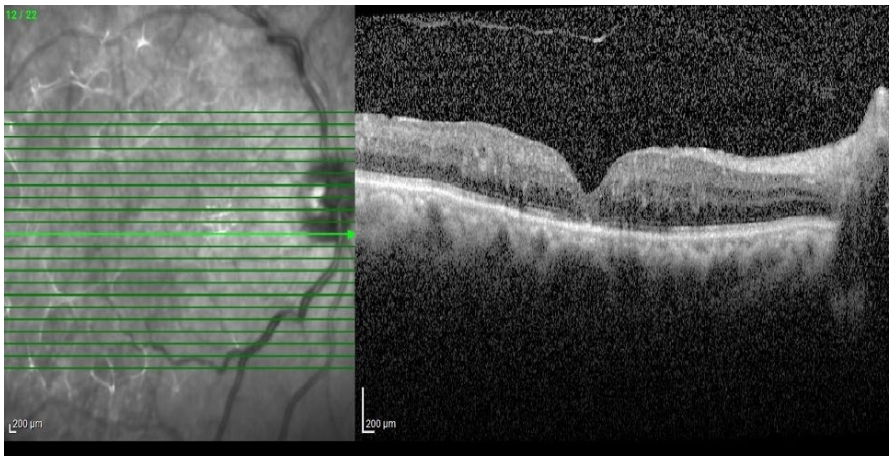

Figure 5. OCT of the right eye at 3 months after three intravitreal aflibercept injections, showing complete resolution of the edema and restoration of architecture with ellipsoid zone disruption.

improving vision and reducing macular edema in BRVO, as supported by recent randomized clinical trials and real-world evidence [12] [13].

At the 3-month follow-up, BCVA in the right eye had improved to 20/40, and OCT demonstrated complete resolution of macular edema with restoration of retinal layers (**Figure 5**).

Informed consent was obtained from the patient for the use of his clinical data and images in this report.

3. Discussion

Branch retinal vein occlusion is the second most common retinal vascular disorder after diabetic retinopathy [14]. Systemic conditions such as hypertension, hyperlipidemia, thrombophilia, hyperviscosity, increased body mass index, renal disease, systemic medications, and various systemic disorders have been reported as risk factors [4].

Polizzi *et al.* reported a case of BRVO following cataract surgery in a patient with hypertensive retinopathy and elevated D-dimer, fibrinogen, and homocysteine levels, suggesting that these factors may have contributed to thrombus formation [3]. At arteriovenous crossing sites, the retinal artery and vein share a common adventitial sheath; thickening of the arterial wall can compress the vein, leading to altered hemodynamics, endothelial damage, and increased risk of thrombosis [5]. Systemic hypertension further facilitates this process [4] [5].

In our patient, systemic hypertension and stage 2 hypertensive retinopathy were present, but no other systemic pathology was detected. This differs from the case described by Polizzi *et al.*, where additional laboratory abnormalities suggested a thrombophilic state [3].

We believe that the BRVO in our patient was primarily associated with intraoperative factors. Although intraoperative blood pressure remained stable (maximum 165/105 mmHg), the presence of a small pupil and dense nuclear cataract prolonged surgical time and necessitated the use of high phacoemulsification energy and elevated intraocular pressure settings [10] [11]. Intraoperative IOP fluctuations during cataract surgery have been documented, particularly during nuclear removal and cortical aspiration. Vasavada *et al.* reported IOP elevations up to 85 mmHg during nuclear removal [10], while Zhao *et al.* documented increases up to 96 mmHg during cortex and viscoelastic removal [11]. Considering that retinal arterial perfusion pressure is approximately 60 mmHg, such elevations could cause venous stasis and secondary thrombus formation. Intraoperative IOP was controlled via the phacoemulsification system's real-time infusion and aspiration settings, and no intraoperative complications such as wound leakage or prolonged anterior chamber collapse occurred. However, transient IOP elevations during nuclear removal and cortical aspiration are expected despite these measures.

Furthermore, preexisting endothelial damage from hypertensive retinopathy likely increased susceptibility to venous occlusion. Our patient received sub-Tenon's anesthesia, which is associated with minimal IOP elevation compared to peribulbar or retrobulbar injections [9] [15]. Therefore, anesthesia technique was unlikely to be a major contributing factor in this case.

Careful preoperative evaluation of systemic risk factors, meticulous intraoperative IOP management, and minimizing surgical time are essential strategies to reduce the risk of retinal vascular events following cataract surgery.

Recent studies have also reported postoperative retinal vascular events following various intraocular procedures, emphasizing the importance of perioperative vascular risk assessment [16] [17].

4. Conclusion

Retinal vein occlusion, although rare, should be considered among the possible complications following cataract surgery. Preoperative evaluation should include assessment of systemic hypertension, hyperlipidemia, renal disease, thrombophilia, cardiovascular disease, and systemic medications. Where possible, topical anes-

thesia should be preferred, and intraoperative intraocular pressure should be maintained within safe limits. Prolonged surgical time should be avoided in patients at high risk for retinal vascular events.

5. Limitations

This case report has certain limitations. Due to the dense nuclear cataract, preoperative optical coherence tomography (OCT) images and color fundus photographs of the affected eye were not available, as media opacity precluded adequate imaging. Furthermore, fluorescein angiography (FA) was not performed in the preoperative period because it is not included in our routine cataract surgery evaluation protocol, given its invasive nature and the lack of clinical indications at that time. These factors limit the ability to definitively exclude subclinical pre-existing retinal vascular changes prior to surgery. In addition, as this is a single case report, causality between the surgical procedure and BRVO cannot be conclusively established, and the event may have been coincidental, potentially attributable to systemic hypertension alone.

Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

References

[1] Kadıoğlu, E. and Gönül, Ş. (2011) The Effect of Anterior Chamber Depth on Endothelial Cell Count and Postoperative Corneal Edema in Phacoemulsification Surgery. *Dicle Medical Journal/Dicle Tip Dergisi*, **38**, 179-183. https://doi.org/10.5798/diclemedj.0921.2011.2.0011

[2] Foster, A. (2000) Vision 2020: The Cataract Challenge. *Community Eye Health Journal*, **13**, 17-19.

[3] Polizzi, S., Barca, F., Caporossi, T., Virgili, G. and Rizzo, S. (2018) Branch Retinal Vein Occlusion Following Cataract Surgery. *Clinical and Experimental Optometry*, **101**, 135-136. https://doi.org/10.1111/cxo.12525

[4] Jaulim, A., Ahmed, B., Khanam, T. and Chatziralli, I.P. (2013) Branch Retinal Vein Occlusion: Epidemiology, Pathogenesis, Risk Factors, Clinical Features, Diagnosis, and Complications. *Retina*, **33**, 901-910. https://doi.org/10.1097/iae.0b013e3182870c15

[5] Kumar, B., Yu, D., Morgan, W.H., Barry, C.J., Constable, I.J. and McAllister, I.L. (1998) The Distribution of Angioarchitectural Changes within the Vicinity of the Arteriovenous Crossing in Branch Retinal Vein Occlusion. *Ophthalmology*, **105**, 424-427. https://doi.org/10.1016/s0161-6420(98)93022-6

[6] Jung, E.H., Park, K.H. and Woo, S.J. (2015) Iatrogenic Central Retinal Artery Occlusion Following Retrobulbar Anesthesia for Intraocular Surgery. *Korean Journal of Ophthalmology*, **29**, 233-240. https://doi.org/10.3341/kjo.2015.29.4.233

[7] Rodríguez Villa, S., Salazar Méndez, R., Cubillas Martín, M. and Cuesta García, M. (2016) Central Retinal Artery Occlusion after Phacoemulsification under Peribulbar Anaesthesia: Pathogenic Hypothesis. *Archivos de la Sociedad Española de Oftalmología* (*English Edition*), **91**, 40-43. https://doi.org/10.1016/j.oftale.2015.12.009

[8] Ellabban, A.A., Patil, A.D., Costen, M.T. and Babar, A.R. (2018) Central Retinal Artery Occlusion during Vitrectomy: Immediate Retinal Revascularization Following Induction of Posterior Vitreous Detachment. *American Journal of Ophthalmology Case Reports*, **9**, 38-40. https://doi.org/10.1016/j.ajoc.2018.01.008

[9] Pianka, P., Weintraub-Padova, H., Lazar, M. and Geyer, O. (2001) Effect of Sub-Tenon's and Peribulbar Anesthesia on Intraocular Pressure and Ocular Pulse Amplitude. *Journal of Cataract and Refractive Surgery*, **27**, 1221-1226. https://doi.org/10.1016/s0886-3350(01)00797-0

[10] Vasavada, V., Raj, S.M., Praveen, M.R., Vasavada, A.R., Henderson, B.A. and Asnani, P.K. (2014) Real-Time Dynamic Intraocular Pressure Fluctuations during Micro Coaxial Phacoemulsification Using Different Aspiration Flow Rates and Their Impact on Early Postoperative Outcomes: A Randomized Clinical Trial. *Journal of Refractive Surgery*, **30**, 534-540. https://doi.org/10.3928/1081597x-20140711-06

[11] Zhao, Y., Li, X., Tao, A., Wang, J. and Lu, F. (2009) Intraocular Pressure and Calculated Diastolic Ocular Perfusion Pressure during Three Simulated Steps of Phacoemulsification in Vivo. *Investigative Ophthalmology & Visual Science*, **50**, 2927-2931. https://doi.org/10.1167/iovs.08-2996

[12] Campochiaro, P.A., Heier, J.S., Feiner, L., Gray, S., Saroj, N., Rundle, A.C., *et al.* (2010) Ranibizumab for Macular Edema Following Branch Retinal Vein Occlusion: Six-Month Primary End Point Results of a Phase III Study. *Ophthalmology*, **117**, 1102-1112.E1. https://doi.org/10.1016/j.ophtha.2010.02.021

[13] Campochiaro, P.A., Clark, W.L., Boyer, D.S., Heier, J.S., Brown, D.M., Vitti, R., *et al.* (2015) Intravitreal Aflibercept for Macular Edema Following Branch Retinal Vein Occlusion: 52-Week Results of the VIBRANT Study. *Ophthalmology*, **122**, 538-544. https://doi.org/10.1016/j.ophtha.2014.08.031

[14] Rogers, S.L., McIntosh, R.L., Lim, L., Mitchell, P., Cheung, N., Kowalski, J.W., *et al.* (2010) Natural History of Branch Retinal Vein Occlusion: An Evidence-Based Systematic Review. *Ophthalmology*, **117**, 1094-1101.E5. https://doi.org/10.1016/j.ophtha.2010.01.058

[15] Findl, O., Dallinger, S., Menapace, R., Rainer, G., Georgopoulos, M., Kiss, B., *et al.* (1999) Effects of Peribulbar Anesthesia on Ocular Blood Flow in Patients Undergoing Cataract Surgery. *American Journal of Ophthalmology*, **127**, 645-649. https://doi.org/10.1016/s0002-9394(99)00066-5

[16] Chatziralli, I., Sergentanis, T.N. and Sivaprasad, S. (2022) Retinal Vein Occlusion after Ocular Surgery: A Systematic Review. *Survey of Ophthalmology*, **67**, 1490-1502.

[17] Lee, J., Woo, S.J., Kim, Y.K., *et al.* (2023) Incidence and Risk Factors of Retinal Vascular Occlusion after Cataract Surgery: A Nationwide Population-Based Study. *American Journal of Ophthalmology*, **249**, 42-51.